REMARKS

The Applicant has carefully considered this application in connection with the Examiner's Action and respectfully request reconsideration of this application in view of the foregoing amendment and the following remarks.

The Applicant originally submitted Claims 1-20 in the application. Previously, the Applicant elected Claims 1-8 and 16-20, canceled Claims 9-15 and amended Claims 1, 2 and 18. Presently, the Applicant has added Claims 21-24. Support for Claim 24 includes paragraph [0025] and support for the Claims 21-23 includes FIG. 2 and 3, and paragraphs [0032]-[0036]. Additionally, the Applicant takes the opportunity to correct an inadvertent typographical error in paragraph [0022]. Accordingly, Claims 1-8 and 16-24 are currently pending in the application.

I. Rejection of Claims 1- 8 and 16-20 under 35 U.S.C. §103

The Office Action rejects Claims 1-2, 4-5, 7, and 16-20 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,060,397 to Seamons *et al.* ("Seamons") in view of U.S. Patent No. 4,960,488 to Law *et al.* ("Law") and further in view of U.S. Patent Publication No. 2004/0055621 to McDermott *et al.* ("McDermott"). Claims 3 and 8 are rejected as being unpatentable over Seamons in view of Law and in further view of U.S. Patent No. 7,028,696 to Richardson *et al.* ("Richardson"). Claim 6 is rejected as being unpatentable over Seamons in view of Law and in further view of U.S. Patent No. 5,158,644 to Cheung *et al.* ("Cheung").

The Applicants respectfully submit that the cited art as applied in the Office Action does not teach or suggest all of the elements of independent Claim 1 and 16. The Applicants also submit that

that Seamons and Law are not properly combined with each other because Seamons as a whole teaches away from a three-step cleaning process, and Law is not properly combinable with McDermott because Law there is no reasonable expectation of successfully introducing multiple substations into Law's chamber.

1) No teaching or suggestion

Claim 1 recites, among other things, a first cleaning step that includes maintaining a deposition chamber at a first pressure, a second cleaning step that includes maintaining the deposition chamber at a second pressure and a third cleaning step that includes maintaining the deposition at a third pressure less than said first and second pressures. Analogous language is presented in Claim 16.

This is in contrast to Seamons who discloses a one-step and two-step cleaning processes (see Seamons, C.8, L.12-42; TABLE 1), or Law, who discloses two in-situ etch steps: a local etch and an wide or extended etch (see Law, C.11, L. 63-C12, L2). McDermott has not been cited in the Office Action for the proposition of teaching or suggesting these elements.

The Examiner maintains that Law's local etch is both a first cleaning step and a second cleaning step, arguing that:

> The repeating of the first cleaning process of Law does in fact constitute a second cleaning process because there was a factor that determined an end to the first process which in turn resulted in the repeating the cleaning a second time. (Detailed Action, Section 3).

The Examiner further argues that Law teaches:

> wherein cleaning electrodes and nearby chamber components under high pressure is

> repeated a number of times (reads on "a first cleaning step" and "a second cleaning step" as instantly claimed) before lower pressure cleaning (reads on "a third cleaning step", as instantly claimed) is performed (col. 2, lines 17-21; paragraph, bridging col. 11 and 12, col. 15, lines 3-5). (Detailed Action, Section 6)

The Applicant respectfully maintains that the recited portions of Law, relied on by the Office Action in rejecting Claims 1 and 16, do not teach or suggest first, second and third cleaning steps as recited in Claims 1 or 16.

For instance, C.2, L.17-21 of Law states;

> Furthermore, one or several cycles of this deposition and local clean sequences may be used before both the local clean and extended cleaning sequences are used following deposition to thoroughly clean the entire reactor and exhaust.

the bridging paragraph of Law (C.11, L61-C.12, L.2) states:

> The present invention encompasses a localized chamber self-etch and a wide area chamber self-etch. These two divergent in-situ etch steps or sequences use the wide pressure capability and the variable close electrode spacing of the present reactor in combination with the gas chemistry described here. The local etch is used to clean the RF electrodes, i.e., the susceptor 16 and the inlet gas manifold face plate 92. The extended or wide area etch cleans the entire chamber including the downstream vacuum system.

and, C.15, L.3-5 of Law states:

> 4. The method of claim 3, further comprising repeating a cycle comprising the first, deposition step and the second, local etch step.

The Applicant notes that there is nothing in the above-cited sections of Law that teaches the presence of three separate cleaning steps. Rather, these sections of Law appear to suggest that Law's local etch and extended etch can be repeated alone or together after a deposition step. This view is supported by Law's statement that:

> Deposits build up faster locally, e.g., on the gas manifold 92, than at the more

> distant areas of the chamber and downstream. Thus typically, the local etch step will be used alone at least several times before it is necessary to use the wide area etch step to clean the entire chamber and downstream. For example, after a number of cycles of deposition and local etch, when the total oxide deposition has reached about 25 microns, the extended etch step is also used. This overall process sequence can be characterized as deposition (or deposition with interspersed etching), local etch, . . . deposition, local etch and then deposition, local etch, extended area etch after the total deposition is about 25 microns. (emphasis added Law, C.12, L.40-51)

Additionally, Law's Table (C.13, L.54-64), explicitly shows his cleaning sequence:

TABLE

Process Step	Thickness/Etch Time
Deposition	1-2 microns
Local Etch	1-1.5 minutes
Deposition	1-2 microns
Local Etch	1-1.5 minutes
.	
.	
.	
Deposition	1-2 microns, 25 micron total
Local Etch	1-1.5 minutes
Extended Area Etch	4 minutes

The Applicant submits that the above sections of Law and the sections relied on by the Office Action appears merely to suggest that the local etch that can be done alone after each deposition, or, done in combination with the wide or extended etch after several depositions. As such, there is no evidence presented in the Office Action to Law's supposed teaching or suggesting of the three-step cleaning process recited in Claims 1 or 16. Therefore, the prior art references, as applied in the Office Action, do not demonstrate a teaching or suggestion of all the elements of Claims 1 or 16, or their dependent claims.

2) Improper combination

The Applicant also submits that a person having ordinary skill in the art would not be motivated to combine the teachings or suggestions of Seamons, Law nor McDermott to arrive at the presently claimed invention because some of these references teach away from each other and from the presently claimed invention, or, do not have a reasonable expectation of success, and as such, are not properly combinable. Two separate instances are presented below:

a) Although Seamons indicates that a multi-step (two-step) cleaning process may be used (Seamons, C.7, L.8-10), Steamons also teaches away from such an embodiment by showing that single step cleaning processes work faster and at lower cost than a two step cleaning process (Seamons, C.8, L38-42). For instance, TABLE 1 in Seamons (C.8, L17-34) shows that a single step N_2 CLEAN or NF_3 CLEAN take about 10 to 15% less time and cost 60 to 30 percent less than a 2-STEP CLEAN. What motive would one of ordinary skill in the art have to adopt a two-step cleaning processes given such clear advantages of a one step cleaning process as taught by Law?

As the Examiner is no doubt aware, a determination of obviousness requires consideration of the invention considered as a whole and the inquiry is not whether each element exists in the prior art, but whether the prior art made obvious the invention as a whole. In light of the whole teaching of Seamons, including his specific teaching of the advantages of a single-step cleaning process over a two-step cleaning process, the Applicant submits that it would not have been obvious to make the modifications of Law's two-step cleaning process such as suggested in the

Office Action, and which still does not teach or suggest the three-step cleaning process presented in Claims 1 and 16.

b) The combination of Law and McDermott is improper because the Office Action has not presented evidence to support a reasonable expectation of success from such a combination. Law teaches that his gas manifold is part of a unique process and gas distribution system designed to flow process gas evenly radially outward across a wafer in a single wafer processing reactor (Law, C.1, L. 39-40; C.3, L.18-20). For instance, Law states:

> The gas manifold 26 is part of a unique process and purge gas distribution system 32 (FIGS. 2 and 3) that is designed to flow the process gas evenly radially outwardly across the wafer 15 to promote even deposition across the wafer and to purge the spent gas and entrained products radially outwardly from the edge of the wafer 15 at both the top and bottom thereof to substantially eliminate deposition on (and within) the gas manifold or box 26 and the chamber 12. The gas manifold is described in detail in the referenced Wang et al parent patent application. (Law, C.3, L.18-28)

The Office Action, however, has not presented evidence that introducing multiple substrates such as taught by McDermott (McDermott [0160]), into Law's chamber would still allow Law's gas manifold and unique process and purge system to successfully promote even deposition across the wafer and to substantially eliminate deposition on the chamber's parts. For instance, why wouldn't the spent gases and entrained products, that are designed to purge radially outward from the top and bottom edges of the wafer, just land on adjacent wafers in a chamber having multiple substrate stations, thereby frustrating Law's goal of promoting even deposition across a wafer? The Applicant submits that because there is no evidence that the modification of Law's chamber from a single station to multiple sub-station chamber has a reasonable expectation of

success, one of ordinary skill in the art would not be motivated to combine the teachings of Law and McDermott as suggested in the office action.

Because the combination of art as applied in the office action does not teach or suggest all elements of independent Claims 1 and 16 or are not properly combinable, they fail to establish a *prima facie* case of obviousness with respect to independent Claims 1 and 16 and their respective dependent claims.

In view of the above arguments, the Applicants therefore respectfully request the Examiner to withdraw the rejections of Claims 1-8 and 16-20.

II. Conclusion

In view of the foregoing amendment and remarks, the Applicants now see all of the Claims currently pending in this application to be in condition for allowance and therefore earnestly solicit a timely Notice of Allowance for Claims 1-8 and 16-24.

The Applicants request the Examiner to telephone the undersigned attorney of record at (972) 480-8800 if such would further or expedite the prosecution of the present application. The Commissioner is hereby authorized to charge any fees, credits or overpayments to Deposit Account 20-0668.

Respectfully submitted,

HITT GAINES, P.C.

Ronald Corbett

Ronald J. Corbett
Registration No. 47,500

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P.O. Box 832570
Richardson, Texas 75083
(972) 480-8800